160Gy to the PTV (GTV + 2mm) and Bard Quicklink system is used to implant I125 radioactive seeds. Multi-modal manual rigid and non-rigid transformations between MR and CT scans were performed on the first 9 patients with three software solutions: the treatment planning system Variseed, a research platform 3D Slicer and a commercial solution Mirada. MR onto CT registrations were approved by an expert uro-radiologist and quantitative evaluations of the registrations were performed by calculating the means of vectors displacement marked on four relevant points of interest detected on the I125 seeds. For the dosimetry, an assessment of the impact of these readjustments on the initial dose matrix was also performed in Mirada by applying the deformation to the initial contours and injecting the initial dose matrix.

Results: For the first 9 patients, evaluation of registration gives means of vectors displacement of 1.52mm [0.36-2.6] with Variseed, 0.62mm [0.26-1.29] with 3D Slicer and 0.42mm [0.24-0.81] with Mirada. Examples of fusions are illustrated in Figure1. Concerning the dosimetric data and considering the most relevant criteria from the initial outline, the D90%(Gy) to the prostate and respectively for the target has a mean difference of +0.68Gy and -12Gy. The D30%(Gy) and the D10%(Gy) to the urethra respectively have a mean difference of -0.99 and -5.58Gy. Lastly, D1cc(Gy) to the rectum has a mean difference of +4,37Gy.

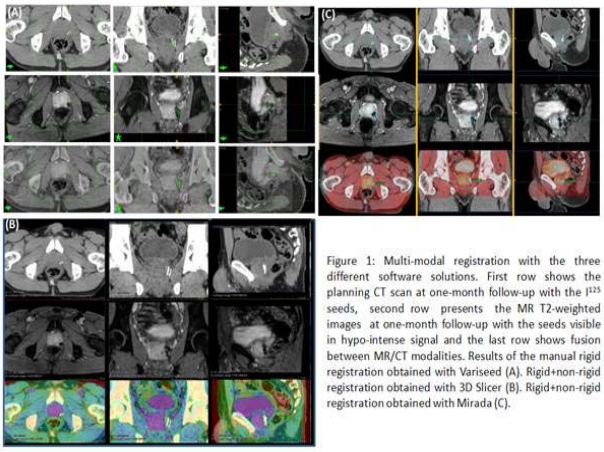

Figure 1: Multi-modal registration with the three different software solutions. First row shows the planning CT scan at one-month follow-up with the I^{125} seeds, second row presents the MR T2-weighted images at one-month follow-up with the seeds visible in hypo-intense signal and the last row shows fusion between MR/CT modalities. Results of the manual rigid registration obtained with Variseed (A). Rigid+non-rigid registration obtained with 3D Slicer (B). Rigid+non-rigid registration obtained with Mirada (C).

Conclusion: Target volume definition remains a crucial step for focal brachytherapy as only confirmed tumor biopsy sub-volumes of the prostate are treated. Registration procedures tested in our institute confirmed the need to implement precise rigid and non-rigid fusion of image to delineate relevant target volumes on different modalities. In addition, dosimetry evaluation on the registrations showed the impact of the deformations in high dose gradients.

EP-2003

HDR brachytherapy in monotherapy of one fraction in patients with prostate cancer at low risk

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Purpose or Objective: The High-dose-rate brachytherapy as monotherapy in one fraction, is a treatment option in patients with low-risk prostate cancer and can be used as an alternative to the low-dose-rate brachytherapy.Compared to the low-dose-rate, the HDR as monotherapy has not proven long-term results with regard to disease control. It is not known what dose of treatment should be used to increase the biochemical control, survival control disease and reduce unaffordable toxic effects.

Material and Methods: Results on patients treated with high-dose-rate brachytherapy as monotherapy are presented below.
Sample: A series of 75 patients between 2008 and 2013 treated with high-dose-rate brachytherapy (HDR) single dose of 19 Gy (62) and 20.5 Gy (13) were selected.
A technique of guided-ultrasound brachytherapy and dynamic-calculated intraoperative dose was used.

Results: The results show an overall survival of 91.3% of patients, with survival free of disease of 97% and a biochemical control of 72.5%.
Patients toxicity: Acute urinary toxicity: 53.8% (grade 2). Chronic urinary toxicity: 49.2% (grade 2). Acute gastrointestinal toxicity: 86.2% (grade 1). Chronic gastrointestinal toxicity: 89% (grade 1).Acute urinary retention rate of 2.9%.

Conclusion: HDR prostate brachytherapy as monotherapy in one single fraction of 19 Gy does not provided adequate biochemical control and survival free disease rates. It is necessary more studies to establish what would be the most appropiate dose to obtain higher rates of disease control

EP-2004

Urethra dose homogeneity constraints in LDR prostate brachytherapy could diminish urinary morbidity

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Purpose or Objective: Evaluate the relationship between RTOG G2-G3 urinary morbidity after prostate brachytherapy and urethral doses at the end of real-time dosimetry planning.

Material and Methods: From November 2007 to December 2010, 204 prostate cancer patients underwent monotherapy I-125 seeds brachytherapy in our institution. Real-time US guided dosimetry planning was performed with Variseed 7.0 or 8.0. Of the 204 patients, 11 (5.4%) developed an acute urinary retention and required a urinary catheter from 2 weeks to 7 months (G2 morbidity), and 7 patients (3.4%) required a transurethral resection of the prostate (G3 morbidity).
In a retrospective study, detailed urethral dosimetry was evaluated at the end of the real-time implant. Assessed values included maximum dose, V80, V100, V150 and D90 for both overall urethra and segmented urethra (as base, midgland and apex urethra). 1.5-mm and 2.5-mm urethral expansions were also reviewed for all dosimetry parameters. To check if dose homogeneity around urethral regions was related to morbidity, subtraction of expanded minus non-expanded urethral dosimetry parameters was also performed. In total, 111 parameters were reviewed.
T-Student test and U Mann-Whitney test were used to compare differences between patients free of urinary morbidity from those presenting G2 and G3 morbidity. $p < 0.05$ was considered significant.

Results: No correlation was found between non-expanded urethra doses and urinary morbidity.
Best result ($p=0.005$) for distinguishing free-morbidity cohort from G2-G3 morbidity-cohort was obtained for subtraction of the maximum dose of the non-expanded minus 2.5-mm-expanded overall urethra.